

**HEAT TRANSFER IN MICROGRAVITY SYSTEMS
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Abstract

Thermoacoustic Streaming and Ultrasonic Processing of Low Melting Melts

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Ultrasonic levitation allows the processing of low melting materials both in 1 Gas well as in microgravity. The **free** suspension of the melts also facilitates undercooking, permitting the measurement of the physical properties of the **metastable** liquids. A convenient method to melt a **leviated** sample involves its spot heating through a **focussed** radiant source, the heat input to the sample is **controlled** by the material **emittance** as well as the external convective flows. **Because** of high intensity sound fields required for levitation, **thermoacoustic** streaming will significantly increase the heat transfer from the sample to the environment, and it will therefore decrease the heating efficiency. Experimental measurement involving flow visualization and power input monitoring have allowed the quantitative assessment of this enhancement in heat transfer at ultrasonic frequencies and for millimeter-size samples. A decrease of temperature of up to 150 C for a sample initially at 550 C without the sound has been measured. Other results involving 1 G and low gravity flow visualization and material processing are presented. [Work sponsored by NASA],